

LOAD LIFTING DEVICE AT A WIND-POWERED DEVICE the invention relates to a wind-powered device with mast, with on it rotatable stored machine frames, on a rotor, a generator etc. the wind-powered device mounted are, and with a wind with a pivotal linkage with a deflection roller.

Wind-powered devices are plants, which become for a lifetime of the main components of approximately 20 to 30 years designed. In this period regular maintenance works have to be accomplished and be replaced in regular intervals of wearing parts. In courses of the lifetime of a wind-powered device are due to the high dynamic operating stress also according to experience larger components like e.g. Rotor blades, gearboxes, to overhaul generators and/or. to repair. Such components must become for this purpose disassembled.

On some known wind-powered devices winds of arranged weight smaller with those parts are, e.g. Tools and spare parts, on the wind-powered device to be lifted can. For heavier components of the wind-powered device and e.g. for the Mtieren of the rotor blades these winds are however not suitable.

In order such components at the state of the art a corresponding wind-powered device install and to dismantle to be able, are the use of a crane necessary. The bottom boundary conditions that nowadays the usually-sold wind-powered devices with approx. 40 m high towers and usually in remote areas installed become, are the availability of cranes very limited suitable to the disassembly. Wind park operators have calculated that the use of a crane costs in the height of up to a dual maintenance annual budget of a wind-powered device caused, and this even in an area with relative good availability of suitable cranes. In this calculation the escaped gain is considered not yet by operating interrupt due to the waiting time up to the arrival of the crane. Another disadvantage with the wind-powered devices in accordance with state of the art is that during the initial assembly of one Wind-powered device the turbine house without rotor blades at the tower mounted becomes. The rotor blades become subsequent single mounted with the crane, whereby the assembly of the rotor blades approx. 50% of the assignment of the crane in claim required for the entire assembly of the wind-powered device, take.

The object of this invention is it to make a wind-powered device available with which the use of a crane can become as far as possible avoided.

Dissolved one becomes this object with an generic in accordance with-eaten wind-powered device by the fact that the linkage in and/or. parallel to that plane is more pivotable, in which the axis of rotation of the rotor lies.

The wind, which is strong enough, in order to serve for the assembly or disassembly of all components of the wind-powered device, a linkage with a deflection roller is associated, in and/or. parallel to that plane is more pivotable, in which the axis of rotation of the rotor lies. Along this axis are usually all substantial components of the wind-powered device, like e.g. the rotor, the gearbox and the generator arranged. There the linkage in and/or. parallel to that plane is more pivotable, in which this axis of the rotor lies, can these components on particularly simple and inexpensive way mounted and disassembled become. In particular also the assembly of the rotor blades without an otherwise required crane can become performed.

The advantages resultant with both embodiments of the invention opposite the state of the art are: - apart. from the initial assembly of the wind with the linkage are the assembly and disassembly of components without Use of a crane possible, whereby a substantial Kostenersparungen and/or. a

shortening that operating bottom refraction (in sequence of the case of way of the waiting time relative Availability and Antransport of a crane) possible are; - a substantial reduction of the crane length of application when only assembling of a wind-powered device, since the rotor blades not bottom aid of a crane mounted to become to have.

Other features and advantages of the invention result from the Unteransprüchen and the subsequent description of embodiments of the invention bottom reference on the designs.

It shows: Fig. 1 an embodiment of a wind-powered device in accordance with the state of the art, Fig. 2 the side view of an embodiment of a wind-powered device in accordance with instant invention, and Fig. 3 the plan view of an embodiment of a wind-powered device in accordance with instant invention.

In Fig. 1 is the execution variant illustrated most frequently used with wind-powered devices. The rotor blades 1 become fixed at the rotor hub 2 with a screw connection. The rotor hub 2 becomes with the rotor shaft 3 bolted. The rotor shaft 3 turns 4 in a bearing block. A gearbox 5 with mounted brake 6 becomes to the rotor shaft 3 mounted. By means of clutch gearbox 5 and generator become 7 connected with one another. Entire driving rank is 8 fixed at the machine frame. A so called azimuth camp inclusive Propulsion 9 turns the entire turbine house into the current wind direction. A small rope hoist 10 serves for drawing up tool, lubricant, small spare parts and such a thing. To the disassembly and/or. Assembly of parts like the rotor blades 1, the bearing support 4, the rotor hub 2, the gearbox 5, the generator of 7 etc. the use of a crane is required.

Into the Fig. 2 and 3 is an embodiment of the invention illustrated. The rotor blades 18 are by means of one in Fig. 2 not represented screw connection with a rotor hub 19 connected. As pivotal connection between the rotor hub and a gearbox 20 a bearing 21 with a spline joint for the torque transmission between the rotor hub 19 serves 19 and the gearbox 20. The gearbox 20 becomes 22 screwed at a machine frame. This applies also to a generator 23, which is 20 connected by means of a clutch with the gearbox. The azimuth camp 24 is the connection between the machine frame 22 and mast 35. The wind direction adjusting happens by means of at least an azimuth drive 25.

To the assembly and/or. Disassembly of rotor hub 19, bearings 21, gearboxes 22, generator 23 and all other components, which do not become in detail mentioned here, serves in connection with wind 26 to machine frames 22 pivotally mounted linkage, which is symmetrical arranged concerning that vertical median plane, in which the axis of rotation of the rotor lies. The linkage exhibits two draft links 29, which are 22 journaled with an end at the machine frame, as well as two preferably prolonged-variable center links 28, is 29 connected of which an end with the machine frame 22 and the other end with the draft link. It can be natural also only a single draft link and/or center link-provided. At the connection of the two draft links 29 a deflection roller is 36 arranged, is 37 guided over which a rope, which can be wound up on the wind 26. With the help of the linkage 28, 29 the deflection on roller can become 36 accurate in the vertical plane moved, in which also the axis of rotation of the rotor 19 as well as the main components are appropriate for the wind-powered device.

The rotor blade assembly the linkage can become 28, 29 at the machine frame 22 into the range over the rotor 19 swung, as in Fig. 2 by suggested position of the linkage 28, 29 shown strichliert is. Drawing a rotor blade 18 up the traction cable 37 becomes by openings 38, 39 in the rotor hub 19 lowered and the rotor blade upward after fastening to the traction cable pulled and to the rotor hub 19 screwed.

In an alternative embodiment direct at the rotor hub 19 can be a deflection roller 27 fixed, over which the traction cable can become 37 the rotor blade assembly guided. Either a single deflection roller 27 for the assembly of the single rotor blades can become 18 reacted again and again or it can each rotor blade 18 and/or each opening 38 in the hub 19 an own deflection roller associated its, whereby the assembly of the rotor blades can become 18 still rapid performed.

If that or the center links 28 prolonged-variable performed are, this can take place on arbitrary way. Preferred one is however, if that or the center links 28 are over a threaded spindle or over a cable prolonged-variable.

In Fig. 3 is a view on the wind-powered device of Fig. 2 from above shown. It is thereby an additional lifting device 30, existing from a rotatable linkage and a small rope hoist, illustrated, to the tools, small spare parts, the wind 26, and/or the deflection roller 27 and the linkage 28, 29 to be drawn up can. This lifting device 30 is preferably 22 fixed at the machine frame. By respective openings 31, 32 in the machine frame 22 knows 30 components with the lifting device such as brake system 33, clutch 34, azimuth drive of 25 and various other small articles disassembled and/or. mounted become, although this can become with suitable pivotable of the linkage 28, 29 also with this performed.